FORM PTO-1390 (Modified) (REV 10-95) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR
1750	09/914901

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/EP 00/01843	MARCH 3, 2000	MARCH 6, 1999

TITLE OF INVENTION

ELECTROMECHANICAL DRIVE ELEMENT COMPRISING A PIEZOELECTRIC ELEMENT

APPLICANT(S) FOR DO/EO/US

Stephan KLEINDIEK

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☐ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
   a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☒ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☐ A copy of the International Search Report (PCT/ISA/210).
8. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☐ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

Items 13 to 18 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
    A **SECOND** or **SUBSEQUENT** preliminary amendment.
16. ☐ A substitute specification.
17. ☐ A change of power of attorney and/or address letter.
18. ☒ Certificate of Mailing by Express Mail
19. ☐ Other items or information:

ET 473368287 US

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
09/914901	PCT/EP 00/01843	1750

20. The following fees are submitted:.

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

		CALCULATIONS PTO USE ONLY
☐	Search Report has been prepared by the EPO or JPO	**$930.00**
☐	International preliminary examination fee paid to USPTO (37 CFR 1.482)	**$720.00**
☐	No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2))	**$790.00**
☒	Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2) paid to USPTO	**$1,070.00**
☐	International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4)	**$98.00**

ENTER APPROPRIATE BASIC FEE AMOUNT =	**$1,000.00**	
Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).	**$0.00**	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	9 - 20 =	0	x $18.00	**$0.00**	
Independent claims	1 - 3 =	0	x $80.00	**$0.00**	
Multiple Dependent Claims **(check if applicable).**			☐	**$0.00**	
TOTAL OF ABOVE CALCULATIONS =				**$1,000.00**	
Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) **(check if applicable).** ☒				**$500.00**	
SUBTOTAL =				**$500.00**	
Processing fee of **$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)). +				**$0.00**	
TOTAL NATIONAL FEE =				**$500.00**	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) **(check if applicable).** ☐				**$0.00**	
TOTAL FEES ENCLOSED =				**$500.00**	
				Amount to be: refunded	$
				charged	$

☐ A check in the amount of to cover the above fees is enclosed.

☒ Please charge my Deposit Account No. **19-4675** in the amount of **$500.00** to cover the above fees.
A duplicate copy of this sheet is enclosed.

☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **19-4675** A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

STRIKER, STRIKER & STENBY
103 EAST NECK ROAD
HUNTINGTON, NEW YORK 11743

SIGNATURE

MICHAEL J. STRIKER
NAME

27233
REGISTRATION NUMBER

SEPTEMBER 5, 2001
DATE

UNITED STATES PATENT AND TRADEMARK OFFICE

Examiner: Group: Attorney Docket # 1750

Applicant(s) : KLEINDIEK, S.

Serial No. :

Filed :

For : ELECTROMECHANICAL DRIVE ELEMENT COMPRISING A PIEZOELECTRIC ELEMENT

SIMULTANEOUS AMENDMENT

September 5, 2001

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

S I R S:

Simultaneously with filing of the above identified application please amend the same as follows:

In the Claims:

Cancel all claims without prejudice.

Substitute the claims attached hereto.

REMARKS:

This Amendment is submitted simultaneously with filing of the above identified application.

With the present Amendment applicant has amended the claims so as to eliminate their multiple dependency.

Consideration and allowance of the present application is most respectfully requested.

Respectfully submitted,

Michael J. Striker
Attorney for Applicant(s)
Reg. No. 27233

Claims

1. Electromechanical drive element, in particular for the exact positioning of an object in the nanometer to centimeter range, comprising a rotor (11) supported in a bearing element and at least one piezoelectric element (18) that can be acted upon with an electric voltage, characterized in that the bearing element (12, 13, 14) comprises at least one rotor receptacle (16) supported on a bearing block (15) in a fashion that allows it to be rotated with limits, which rotor receptacle (16) can be rotated by the expansion and/or contraction—induced by an electric voltage—of the at least one piezoelectric element (18).

2. Drive element according to Claim 1, characterized in that the rotor (11) is supported in the at least one rotor receptacle (16) in a fashion that allows it to be rotated with friction.

3. Drive element according to Claim 1 [or 2], characterized in that the at least one rotor receptacle is a bearing ring (16) that is supported on the bearing block (15) by way of multiple fixed members.

4. Drive element according to [one of the Claims 1 through 3] Claim 1, characterized in that the bearing element (12, 13, 14) has two bearing rings (16) as rotor receptacles supported on bearing blocks (15) by way of multiple fixed members (17) in which the ends (11.1, 11.2) of the rotor (11) are supported, whereby at least one of the bearing rings (16) can be rotated by means of at least one piezoelectric element (18).

5. Drive element according to [one of the Claims 1 through 3] Claim 1, characterized in that the bearing element (12, 13, 14) has a piezoelectrically driven bearing ring (16) to accommodate one end (11.1) of the rotor (11), and a lower-friction abutment for the other end (11.2) of the rotor (11).

6. Drive element according to [one of the Claims 2 through 5] Claim 2, characterized in that the friction between the rotor (11) and the at least one rotor receptacle (16) is such that the rotor (11) does not follow relatively rapid revolutions of the at least one rotor receptacle (16), but follows relatively slow revolutions of the at least one rotor receptacle (16).

7. Drive element according to Claim 6, characterized in that the electrodes of the at least one piezoelectric element (18) are connected to a saw-tooth voltage generator that generates alternating slow and rapid expansions and contractions of the at least one piezoelectric element (18) and, therefore, revolutions of the at least one rotor receptacle (16), whereby the rotor (11) follows the slow revolutions and does not follow the rapid revolutions.

8. Drive element according to [one of the Claims 1 through 7] Claim 1, characterized in that the rotor (11) has tapering ends.

9. Drive element according to Claim 8, characterized in that the rotor (11) has ends designed in the shape of spherical cups.

Claims

1. Electromechanical drive element, in particular for the exact positioning of an object in the nanometer to centimeter range, comprising a rotor (11) supported in a bearing element and at least one piezoelectric element (18) that can be acted upon with an electric voltage, characterized in that the bearing element (12, 13, 14) comprises at least one rotor receptacle (16) supported on a bearing block (15) in a fashion that allows it to be rotated with limits, which rotor receptacle (16) can be rotated by the expansion and/or contraction—induced by an electric voltage—of the at least one piezoelectric element (18).

2. Drive element according to Claim 1, characterized in that the rotor (11) is supported in the at least one rotor receptacle (16) in a fashion that allows it to be rotated with friction.

3. Drive element according to Claim 1, characterized in that the at least one rotor receptacle is a bearing ring (16) that is supported on the bearing block (15) by way of multiple fixed members.

4. Drive element according to Claim 1, characterized in that the bearing element (12, 13, 14) has two bearing rings (16) as rotor receptacles supported on bearing blocks (15) by way of multiple fixed members (17) in which the ends (11.1, 11.2) of the rotor (11) are supported, whereby at least one of the bearing rings (16) can be rotated by means of at least one piezoelectric element (18).

5. Drive element according to Claim 1, characterized in that the bearing element (12, 13, 14) has a piezoelectrically driven bearing ring (16) to accommodate one end (11.1) of the rotor (11), and a lower-friction abutment for the other end (11.2) of the rotor (11).

6. Drive element according to Claim 2, characterized in that the friction between the rotor (11) and the at least one rotor receptacle (16) is such that the rotor (11) does not follow relatively rapid revolutions of the at least one rotor receptacle (16), but follows relatively slow revolutions of the at least one rotor receptacle (16).

7. Drive element according to Claim 6, characterized in that the electrodes of the at least one piezoelectric element (18) are connected to a saw-tooth voltage generator that generates alternating slow and rapid expansions and contractions of the at least one piezoelectric element (18) and, therefore, revolutions of the at least one rotor receptacle (16), whereby the rotor (11) follows the slow revolutions and does not follow the rapid revolutions.

8. Drive element according to Claim 1, characterized in that the rotor (11) has tapering ends.

9. Drive element according to Claim 8, characterized in that the rotor (11) has ends designed in the shape of spherical cups.

August 16, 2001

DECLARATION

The undersigned, Dana Scruggs, having an office at 7970 Sunset Cove Drive, Indianapolis, Indiana 46236, hereby states that she is well acquainted with both the English and German languages and that the attached is a true translation to the best of her knowledge and ability of PCT/EP 00/01843 of KLEINDIEK, S., entitled "Electromechanical Drive Element Comprising a Piezoelectric Element".

The undersigned further declares that the above statement is true; and further, that this statement was made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or document or any patent resulting therefrom.

Dana Scruggs

1prts

ELECTROMECHANICAL DRIVE ELEMENT COMPRISING A PIEZOELECTRIC ELEMENT

ELECTROMECHANICAL DRIVE ELEMENT

Description

The invention concerns an electromechanical drive element, in particular for the exact positioning of an object in the nanometer to centimeter range, comprising a rotor supported in a bearing element and at least one piezoelectric element that can be acted upon with an electric voltage.

EP 0 611 485 B1 makes known a linear motor comprising a piezoelectric element that is suited to positioning a tip of a needle-like probe down to a range of the atomic order on a surface of an object. This known positioning element is unusual in that the probes can move with high precision in the nanometer range while, at the same time, travelling greater adjusting paths in the centimeter range. As such, it avoids the disadvantages of traditional devices such as guide play, reversing play, drift, susceptibility to vibration, or oversizing.

The known positioning element is only conditionally suited to changing the angular position of an object, however. To accomplish this, the positioning elements must be used with corresponding coupling elements to the object to be positioned, such as a probe. Additionally, only small angular adjustments can be achieved.

The present invention is based on the object of creating an electromechanical drive element that can adjust the angular position of objects with high precision using minimal structural expenditure.

The object is solved according to the invention using an electromechanical drive element of the type described initially in that the bearing element has at least one rotor receptacle supported on a bearing block in a fashion that allows it to rotate with limits, which rotor receptacle can be rotated by the expansion and/or contraction—induced by an electric voltage—of the at least one piezoelectric element.

The drive element according to the invention can be produced in very small dimensions, so that disruptions by temperature or external mechanical effects such as impact sounds are extremely minimal.

The at least one piezoelectric element changes its expansion under the influence of the electric voltage by approximately only one micrometer, so that the motions of the at least one rotor receptacle are extremely minimal. So that the rotor can also travel greater adjusting paths, the rotor can be supported in the at least one rotor receptacle in a manner that allows it to rotate with friction. The friction between the rotor and the at least one rotor receptacle can thereby preferably be such that the rotor does not follow relatively rapid revolutions of the at least one rotor receptacle, but follows relatively slow revolutions of the at least one rotor receptacle. Therefore, if the rotor receptacle is moved slowly by the piezoelectric element, the rotor follows the motion. If, on the other hand, the rotor receptacle is moved relatively quickly by the piezoelectric element, the rotor can no longer follow the motion due to it inertia. Using successive, alternating slow and rapid motions of the rotor receptacle, a quasi continuous revolution of the rotor in the rotor receptacle can be achieved. The electrodes of the at least one piezoelectric element can be connected to a saw-tooth voltage generator for this purpose, which generates alternating slow and rapid expansions and contractions of the at least one piezoelectric element and, therefore, revolutions of the at least one rotor receptacle, whereby the rotor follows the slow revolutions and does not follow the rapid revolutions.

Preferably the at least one rotor receptacle can be a bearing ring that is supported on the bearing block by way of multiple fixed members. The fixed members form flectors, which gives the element high mechanical stability. In traditional arrangements, forces transferred to the piezoelectric element from the outside, in particular forces transverse to its direction of expansion, can destroy the fragile piezoelectric crystal. The flectors formed by the fixed members can absorb such transverse forces, however, so that the piezoelectric crystal is not destroyed.

A further advantage of this arrangement lies in the fact that the flectors do not need to guide the parts to be moved and thereby generate restoring forces. The restoring forces of the fixed members only act upon the piezoelectric element and are also very small, because the piezoelectric element expands or contracts by approximately only one micrometer. Since the fixed members do not grip the rotor, arbitrarily big angular adjustments of the rotor can be achieved as well.

In a further advantageous design, the bearing element can have two bearing rings as rotor receptacles supported on bearing blocks by way of multiple fixed members in which the ends of the rotor are supported, whereby at least one of the bearing rings can be rotated by means of at least one piezoelectric element. It is therefore also possible to drive the rotor from both sides or from one side only, whereby the second bearing ring then serves as a pure abutment. In every case, the two bearing rings form two friction bearings that are pressed against the rotor, which makes it possible for the rotor to rotate without play. Precise adjustments in the nanometer range can also be achieved as a result.

In another design, the bearing element can have a piezoelectrically driven bearing ring for accommodating one end of the rotor and a lower-friction abutment for the other end of the rotor. Particularly precise motions can be achieved using such a design.

To reduce the friction, the rotor can also have tapering ends. They can be designed as spherical cups, for example. If the rotor is driven on only one side, it is advantageous if the spherical cup on the abutment has a smaller diameter.

A preferred embodiment of a drive element according to the invention will be described below in greater detail using the diagram.

Figure 1 shows a side view of a drive element according to the invention.
Figure 2 shows an internal view of a bearing element of the drive element from Figure 1.

The drive element 10 from Figure 1 has a rotor 11 with tapering ends 11.1 and 11.2 that are supported in two bearing elements 12 and 13. The two bearing elements 12 and 13 are connected with each other by way of braces 14. Together they form the bearing element for the rotor 11. The bearing elements 12 and 13 are thereby pressed against the rotor in springy fashion.

In the internal view of the bearing element 12 from Figure 2 it is obvious that it is formed from a bearing block 15, to which a bearing ring 16 is fastened as rotor receptacle by way of three fixed members 17. The rotor 11, which is not shown in Figure 2, is then inserted in the bearing ring 16. Using a piezoelectric element 18, the electrodes of which are connected with a saw-tooth voltage generator, for example, in a fashion not shown in greater detail, the bearing ring 16 can be set into rotation by expansion and contraction of the piezoelectric element 18, whereby the fixed elements 17 act as flectors. The rotor 11 is supported in the bearing ring 16 with friction in such a fashion that it can follow slow revolutions of the bearing ring 16, but cannot follow rapid motions due to its inertia. Using slow motions of the bearing ring 16, the rotor can therefore be adjusted in very small angular adjustments, while large angular adjustments or even a continuous revolution of the rotor 11 can be achieved by alternating between rapid and slow motions of the bearing ring 16.

The drive element 10 shown is therefore suited to positioning an object with very small angular adjustments as well as with large angular adjustments.

The second bearing element 13 can be designed exactly the same as the bearing element 12, but it can also form a simple abutment for the rotor, whereby, advantageously, the friction between the rotor 11 and the abutment 13 is less than between the rotor 11 and the bearing ring 16.

Claims

1. Electromechanical drive element, in particular for the exact positioning of an object in the nanometer to centimeter range, comprising a rotor (11) supported in a bearing element and at least one piezoelectric element (18) that can be acted upon with an electric voltage, characterized in that the bearing element (12, 13, 14) comprises at least one rotor receptacle (16) supported on a bearing block (15) in a fashion that allows it to be rotated with limits, which rotor receptacle (16) can be rotated by the expansion and/or contraction—induced by an electric voltage—of the at least one piezoelectric element (18).

2. Drive element according to Claim 1, characterized in that the rotor (11) is supported in the at least one rotor receptacle (16) in a fashion that allows it to be rotated with friction.

3. Drive element according to Claim 1 or 2, characterized in that the at least one rotor receptacle is a bearing ring (16) that is supported on the bearing block (15) by way of multiple fixed members.

4. Drive element according to one of the Claims 1 through 3, characterized in that the bearing element (12, 13, 14) has two bearing rings (16) as rotor receptacles supported on bearing blocks (15) by way of multiple fixed members (17) in which the ends (11.1, 11.2) of the rotor (11) are supported, whereby at least one of the bearing rings (16) can be rotated by means of at least one piezoelectric element (18).

5. Drive element according to one of the Claims 1 through 3, characterized in that the bearing element (12, 13, 14) has a piezoelectrically driven bearing ring (16) to accommodate one end (11.1) of the rotor (11), and a lower-friction abutment for the other end (11.2) of the rotor (11).

6. Drive element according to one of the Claims 2 through 5, characterized in that the friction between the rotor (11) and the at least one rotor receptacle (16) is such that the rotor (11) does not follow relatively rapid revolutions of the at least one rotor receptacle (16), but follows relatively slow revolutions of the at least one rotor receptacle (16).

7. Drive element according to Claim 6, characterized in that the electrodes of the at least one piezoelectric element (18) are connected to a saw-tooth voltage generator that generates alternating slow and rapid expansions and contractions of the at least one piezoelectric element (18) and, therefore, revolutions of the at least one rotor receptacle (16), whereby the rotor (11) follows the slow revolutions and does not follow the rapid revolutions.

8. Drive element according to one of the Claims 1 through 7, characterized in that the rotor (11) has tapering ends.

9. Drive element according to Claim 8, characterized in that the rotor (11) has ends designed in the shape of spherical cups.

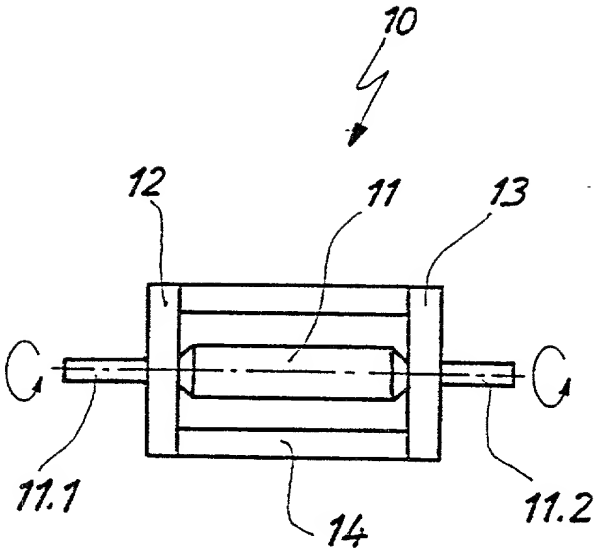

Fig.1

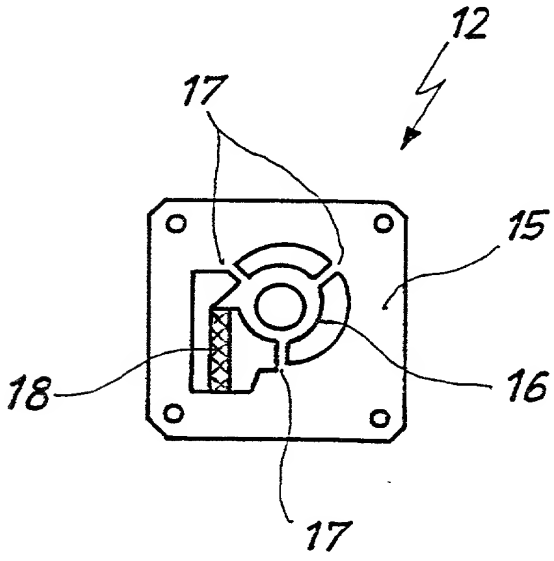

Fig.2

P10224-US

DECLARATION AND POWER OF ATTORNEY FOR NATIONAL STAGE OF PCT PATENT APPLICATION

As a below-named inventor, I hereby declare that:

Stephan KLEINDIEK

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **ELECTROMECHANICAL DRIVE ELEMENT COMPRISING A PIEZOELECTRIC ELEMENT** the specification of which was filed as PCT International Application number PCT/EP 00/01843 on March 3, 2000.

I hereby state that I believe the named inventor or inventors in this Declaration to be the original and first inventor or inventors of the subject matter which is claimed and for which a patent is sought.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365 (b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior foreign application(s):			Priority claimed:	
199 09 913.8	GERMANY	MARCH 6, 1999	X	
(Number)	(Country)	(Date filed)	Yes	No
(Number)	(Country)	(Date filed)	Yes	No

As a named inventor, I hereby appoint the following attorney to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

(1) Michael J. Striker, Reg. No. 27233

Direct all telephone calls to Striker, Striker & Stenby at telephone no.: (631) 549 4700 and address and all correspondence to:

STRIKER, STRIKER & STENBY
103 East Neck Road
Huntington, New York 11743
U.S.A.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such wilful false statement may jeopardize the validity of the application or any patent issued thereon.

Signature: Kleindiek	Date: 27-AUG-01	Residence and Full Postal Address: Markwiesenstrasse 55 72770 Reutlingen Germany DEX
Full Name of First or Sole Inventor: Stephan KLEINDIEK	Citizenship: GERMAN	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Second Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Third Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Fourth Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Fifth Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Sixth Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Seventh Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Eighth Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Ninth Inventor:	Citizenship:	

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